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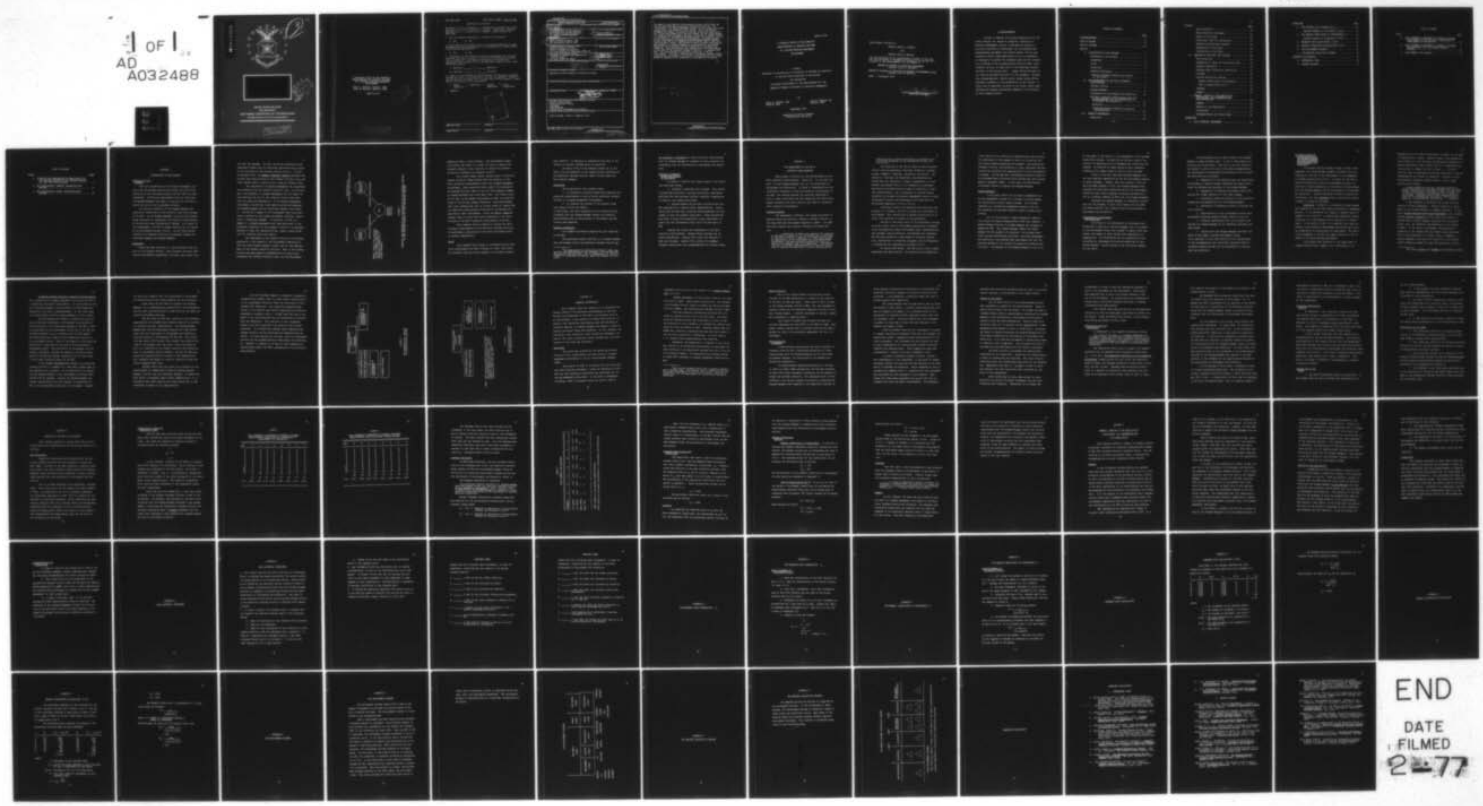

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UNITED STATES AIR FORCE

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Wright-Patterson Air Force Base, Ohio

A FOLLOW-ON STUDY OF THE AUTHORITY RELATIONSHIPS OF CONTRACT OFFICERS IN A PROJECT/PROGRAM MANAGEMENT ENVIRONMENT

Bobby D. Buffkin, Captain, USAF
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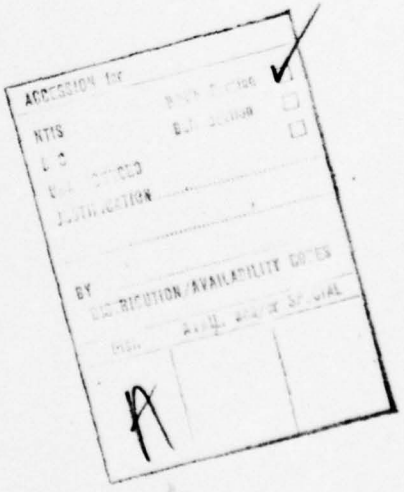

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The authority relationships of the procuring contract officer over the past few years have been clouded with confusion and conflict. The introduction of the program management concept into the systems acquisition process added a new dimension to this problem. Within the program management environment, the procuring contract officer has traditionally had to serve two managers--his functional manager and the program manager. This organizational arrangement has served in the past to create a conflict of allegiances for the procuring contract officer. The objective was to explore the authority relationships of the procuring contract officer through a replication of a research effort by Captain John R. Block and Captain Gordon E. Hadlow. The contract officer's authority relationships were measured as a contrast between his relationship with the program manager and his relationship with the Directorate of Procurement and Production. These relationships were examined within the system program offices (SPO) of the Electronic Systems Division at L. G. Hanscom Field, Mass. The study revealed no significant correlation in the two relationships. This result indicated that the procuring contract officer does perceive a difference in his authority relationship with the program manager as compared to the Directorate of Procurement and Production.

SLSR 40-76B

A FOLLOW-ON STUDY OF THE AUTHORITY RELATIONSHIPS OF CONTRACT OFFICERS IN A PROJECT/PROGRAM MANAGEMENT ENVIRONMENT

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

By

Bobby D. Buffkin, BBA
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John W. Hancock, BA
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September 1976

This thesis, written by

Captain Bobby D. Buffkin

and

Captain John W. Hancock

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT
(Captain Bobby D. Buffkin)

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT (PROCUREMENT MAJOR)
(Captain John W. Hancock)

DATE: 7 September 1976

COMMITTEE CHAIRMAN

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CHAPTER I

INTRODUCTION TO THE PROBLEM

Statement of the Problem

With the introduction of the program management concept into the systems acquisition process the traditional authority of the procuring contract officer (PCO) has been undermined. Conflicting requirements from his functional and Program Managers have made it difficult for the PCO to define his role in the procurement process.

The decision authority of the Program Manager has replaced or eroded much of the authority that once belonged to the PCO. As the Program Manager's role and work assignments have grown in importance, the authority relationships of the PCO have been substantially changed. As a result of this development, the PCO no longer functions as the leader in the procurement process (9:K-3). He now finds himself involved in a possible conflict of allegiance between his functional manager and Program Manager.

Background

There has been, and still is, much confusion over the role of the contract officer. This confusion has been identified by government commissions, articles, and studies over

the past two decades. In 1955, the Hoover Commission first expressed concern over the declining importance being placed on the functions of the contract officer (9:K-1). As late as February 1974, the Federal Contracts Reports expressed the opinion that clarification of the contract officer's role was still needed (9:K-1), pointing out a need for further study.

The introduction of program management has compounded the confusion over the contract officer's role. For the most part, the dimension of program management and its impact on the authority and role of the contract officer leave much room for study and explanation. In the program management environment, the PCO can find himself serving two managers, the Program Manager and his functional manager (see Figure 1). The PCO as a member of the procurement work force maintains a position in the normal procurement workflow, reporting to a functional manager. In addition, the PCO is a member of a program management work team whose goal is the successful completion of the program to which it is assigned. Because of these two responsibilities, there is more potential for confusion than ever before.

The importance of the contract officer is not denied, especially in the reports to the Procurement Commission in 1974 and other studies urging a closer look at, and improvement of the contract officer's position. Most of the studies and articles make general recommendations to clarify and strengthen the contract officer's role, but the Procurement

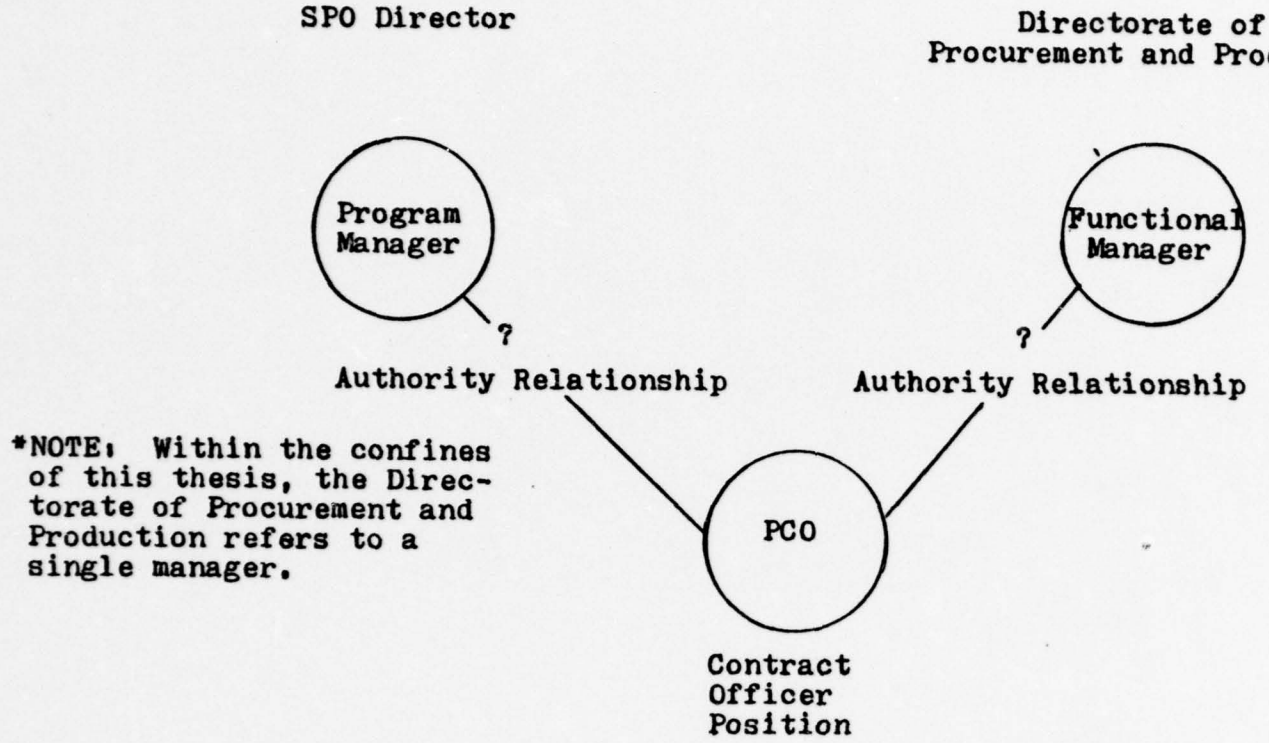

FIGURE 1

AUTHORITY AND RESPONSIBILITY RELATIONSHIP OF THE CONTRACT OFFICER TO THE PROGRAM MANAGER AND THE FUNCTIONAL MANAGER

Commission went a little further. The Procurement Commission stated that there is a need, not only to clarify the contract officer's role, but also to clarify the methods by which he receives his authority (9:K-1).

In a recent thesis effort, Captain John R. Block and Captain Gordon E. Hadlow delved into the conflict in the PCO's authority relationships within the program management environment. They restricted their study to the Aeronautical Systems Division (ASD) of the Air Force Systems Command at Wright-Patterson Air Force Base, Ohio. The thesis pointed out that in the dynamic environment at ASD, the relationships of the PCO may change frequently. They acknowledged that their research was only an initial effort at explaining the authority relationships of the PCO in the Systems Program Office (SPO) environment. Block and Hadlow suggested several areas of study that would contribute to the clarification of the PCO's authority relationships (1:59-60).

This research effort attempts to clarify the PCO's authority relationships in the Electronic Systems Division, by performing a replication of the Block and Hadlow study on another organization.

Scope

This research was limited to investigating the authority relationships of PCO's working in a SPO. Only PCO's who actually sign and direct changes to the actual contract

were studied.[1] No analysis or examination was made of the variety of specific systems which are procured.

The major focus of the research effort was on the PCO's role and authority in the organizational structure of the Electronic Systems Division (ESD), United States Air Force System Command.

Objectives

The objectives of this research were:

1. To replicate a previous study which explored the authority relationships of the Air Force procuring contract officer in a program management environment.

2. To contrast the results of the present study with those of Block and Hadlow.

In particular, the PCO's perception of his authority relationships with the Program Manager versus his authority relationships with the Directorate of Procurement and Production were examined.

Research Hypothesis

The research hypothesis explored by this study was as follows:

The procuring contract officers in a program management environment within the Electronic Systems Division do

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[1]The Administrative Contracting Officer (ACO), who monitors the performance of the contract, and the Terminating Contract Officer (TCO), who is responsible for the settlement of terminated contracts, were not studied (11:Vol. 1,15).

not perceive a difference in their authority relationships with the Program Manager as compared to their authority relationships with the Directorate of Procurement and Production.

Preview of Research Effort and Content of the Report

In order to complete this thesis effort, the following steps were taken:

1. Pertinent literature was reviewed. This review included DOD Directives, business periodicals, previously published DOD institutional reports, speeches, congressional reports, and unpublished theses.

2. System Program Offices were visited within the ESD organization at Hanscom Field, Massachusetts. Discussions with the PCOs were conducted after gathering the data needed to test the research hypothesis. These discussions were held to allow the researchers to gain additional insight into the environment within which the PCO works at ESD.

Chapter Two covers the development of the PCO's authority relationships. Chapter Three outlines the research methodology. Chapter Four covers the analysis of data and findings. Chapter Five contains the summary, research conclusions, and recommendations for further study.

CHAPTER II

THE DEVELOPMENT OF THE PCO'S AUTHORITY RELATIONSHIPS

Three people contribute to the establishment of any PCO's authority relationships. These are: (1) the PCO himself, (2) the Program Manager, and (3) the Directorate of Procurement and Production. In order to comprehend how this triumvirate interacts to form the authority relationships of the PCO, this chapter defines the functions performed by each of these individuals and then describes how these three people interface with each other as they seek to accomplish their respective assignments.

Contract Officer

The Department of Defense, the largest purchaser of American goods and services, defines a contract officer in the Armed Services Procurement Regulation (ASPR). The ASPR definition states that contract officers are persons who are:

> . . . authorized to enter into contract for supplies or services on behalf of the Government and in the name of the United States of America, by formal advertising, by negotiation, or by coordinated or interdepartmental procurement; and when authorized administer such contracts in accordance with this regulation. Contracting officers at contract administration offices are authorized to perform the applicable contract administration

> functions and to perform additional procurement functions when delegated by the purchasing officer [10: Vol.II,10].

The selection of any PCO is based on many considerations, such as experience, training, education, business acumen, judgment, character, reputation, and ethics. The education, training, and experience considerations are broken down and evaluated in terms of experience in a government procurement office or in commercial procurement. Educational considerations are based on education in business administration, law, accounting, or related fields, completion of Defense Procurement Management Course or other procurement courses, and knowledge of the Armed Services Procurement Regulation (11:Vol.I,73-74).

Following a period of supervised training under the guidance of a sponsor, the PCO is issued his certificate of appointment. This certificate or warrant authorizes him to enter into contracts on behalf of the government.

The PCO is the focal point in the procurement process. He plays a major role in procurement planning and documentation--including the advance procurement plan, Determinations and Findings, source selection, and Requests for Proposals. The PCO also serves as a team leader in contract negotiation, evaluations of contractor proposals, and he eventually is responsible for awarding the contract (4:16).

No typical PCO exists. The PCO and his roles change depending upon many factors. His authority and responsibil-

ities vary with his service and organizational affiliations, the importance of the program on which he is working, and the buying command supporting the program. The personality strength, ability, and motivation of each individual PCO will dictate the authority and responsibility he will be required to assume. One PCO may have considerable authority based on the aforementioned attributes while another may end up being merely a document signer. In any case, the PCO performs procurement duties to support the Program Manager.

Program Manager

In the early 1960's the Air Force implemented the project management concept as an attempt to better manage the acquisition of major weapon systems. This concept resulted in a centralized management authority over all the technical and business aspects of major systems acquisitions.

Out of this concept a single management organization called the System Program Office (SPO) was created. A System Program Director or Program Manager was assigned to manage the SPO. The Program Manager became the single manager for the system to be acquired. His primary functions include establishing schedules, directing development and production, and insuring that performance and cost objectives defined by his service and approved by DOD are met (5:17,29). The essence of the Program Manager's role is to

be the agent of the service in the management of the systems acquisition process. He must act as the main focus of authority and responsibility for managing and controlling the program. In addition to these duties he must constantly interface with higher levels of the Air Force and DOD.

Prior to 1961 the individual Program Managers did not have complete responsibility for the procurement aspects of their programs. However, with the creation of the Air Force Systems Command in 1961, the Program Managers were assigned the additional responsibility for all procurement functions within their programs including accountability for all contracts awarded by PCO's for the Program Managers.

Although the Program Manager is completely accountable for his program, he must still comply with the ASPR and obtain approval for contracts from the Directorate of Procurement and Production.

Directorate of Procurement and Production

The office of the Directorate of Procurement and Production is made up of one head manager, who is an expert in the procurement field, and a number of expert staff personnel, the number of which varies from organization to organization. The Directorate has the responsibility for reviewing all procurement actions and approving all contracts awarded. He also serves as the functional manager for all PCO's.

The Directorate and his staff supports the Program Manager in many different ways. A few of these support activities are listed below. This list is not all inclusive but serves to point out a few of the tasks accomplished by the Directorate of Procurement and Production and his staff. The functions are as follows:

1. Preparation of the detailed plan for acquisition and delivery of weapon systems components and repair parts under the guidance and approval of the Program Manager.

2. Preparation of detailed procurement plans that provide for timely execution of the total program.

3. Continuous review and analysis of the production program and recommendations for the Program Manager.

4. Assistance in developing contract financial and cost controls.

5. Administration of all procurement actions from procurement planning release through contract close out.

6. Conducts negotiations with the contractor and advises the Program Manager of any impending potential program impact.

7. Insures that the Program Manager and PCO's are aware of and support current procurement policy.

It is important to note that Functions Five through Seven in the aforementioned list constitute important areas of interface between the PCO and the Directorate of Procurement and Production.

The PCO's Authority Relationships with the Program Manager and the Directorate of Procurement and Production

In a recent article General George S. Brown, then Commander, Air Force Systems Command, contended that contracting is "the key to any improvement in the management of systems acquisitions [2:56]." In order for the PCO to function effectively within this management process, he must have a clear perception of his authority relationships with the Program Manager and the Directorate of Procurement and Production. Before discussing the PCO's authority relationships, the term authority must be defined and simple concepts of authority reviewed.

Authority. Authority is considered by many management experts as the critical factor effecting the management process. It is defined as the "legal or rightful power to command or act [3:226]." In traditional management theory, authority is a right granted from a superior to a subordinate. In the case of a PCO, he is granted this right by a superior (Directorate of Procurement and Production) which is evidenced by his certificate of appointment. The certificate delegates to the PCO the legal authority to act on behalf of the United States government.

The concept that authority is the legal power to command granted from a superior to a subordinate is in

agreement with the views of Max Weber, an expert in the area of organizational theory. However, Weber's view emphasized that authority is the "willing, unconditioned compliance of people resting upon their belief that it is legitimate for the superior to impose his will on them . . . [6:216]." Thus the idea of legitimacy concerning authority is a key to understanding the concept of authority. William G. Scott and Terence R. Mitchell describe Weber's view of legal authority as follows:

> People possessing rational legitimate authority secure compliance to their goals because they are technically (functionally) equipped to spell out what sort of ends are necessary to be pursued for the good of the system. Followers accept these prescriptions because of the acknowledged expertise of the decision-maker who is selected for his ability . . . [6:217]."

A new dimension of authority has arisen with the advent of project management. Project authority is delegated to the project manager or program director.[2] In the book, Systems Analysis and Project Management, David Cleland defined project authority as "the legal and personal influence that a project manager exercises over the scheduling, cost, and technical considerations of the project [3:229]." In the project environment, the exercise of authority is far removed from the normal power associated with a chief executive in a formal chain of command. A project manager's real basis for authority is his professional reputation among his peers and associates (3:229).

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[2]The terms project and program are synonymous herein.

Procuring Contract Officer's Authority Relationships. The introduction of program management has placed the PCO in a completely new type of environment. His relationships with his functional manager, the Directorate of Procurement and Production, are fairly straightforward. On the other hand, his relationships with the Program Manager are very subtle.

The PCO receives his warrant to award and sign contracts from the Directorate of Procurement and Production. The Directorate is the functional manager of the PCO in that he supervises all the procurement activities of the PCO and provides approval for all contracts that the PCO awards. The Directorate also keeps the PCO updated and advised on all procurement policy. Much of the support in the plans for acquisition is provided for the PCO by the Directorate's procurement staff. The Directorate of Procurement and Production, therefore, through the warrant of authority delegated to the PCO and through supervision of his activities is the formal authority source of the PCO.

In the program management environment, the procuring contract officer is a member of a team whose primary goal is the completion of a project. He is responsible for supporting the Program Manager in all procurement activities associated with the program. Because the Program Manager has overall responsibility for his program, he supervises the PCO in the procurement activities of the program. However,

the fact still remains that the Directorate of Procurement and Production must give final approval for all contracts.

Thus, while the PCO works to support the Program Manager, he is simultaneously responsible to the Directorate and his staff and additionally he must abide by the ASPR and current procurement policies.

The fact that the PCO must function in two different organizations can automatically promote conflicts of authority, loyalty, and goal compatibility. The System Program Manager may view the requirements exerted on a PCO differently than the Directorate of Procurement and Production, creating conflict in allegiances for the PCO. This situation may cause a PCO to more fully support the opinions and views of one manager over the other. This action may result in a reduction of his overall authority and effectiveness in procurement decision making. The way the PCO perceives his responsibility to either of the organizations will determine the amount of conflict created by these different organizational ties.

Another factor that may affect the situation is the effectiveness of communication among the System Program Manager, the PCO, and the functional manager. No matter how much effort is expended toward better communication, it is inevitable that some conflict will arise mainly due to the difference in goals of the organizations.

Air Force Systems Command is presently undergoing a reorganization attempt that is a move toward centralization of all procurement functions under the Directorate of Procurement and Production. The simplified organizational charts of the "before" and "after" organizations at ESD are presented in Figures 2 and 3. At ESD there was also an upgrade of the rank structure for the Directorate of Procurement and Production. This position is now a Brigadier General slot which equalizes this position with the SPO directors. It is hoped that through these organizational changes conflict can be alleviated and communications enhanced. If these results are obtained, then the procurement function can be accomplished more effectively and efficiently. However, it remains to be seen if these changes will significantly affect the PCO's perceptions of his authority relationships.

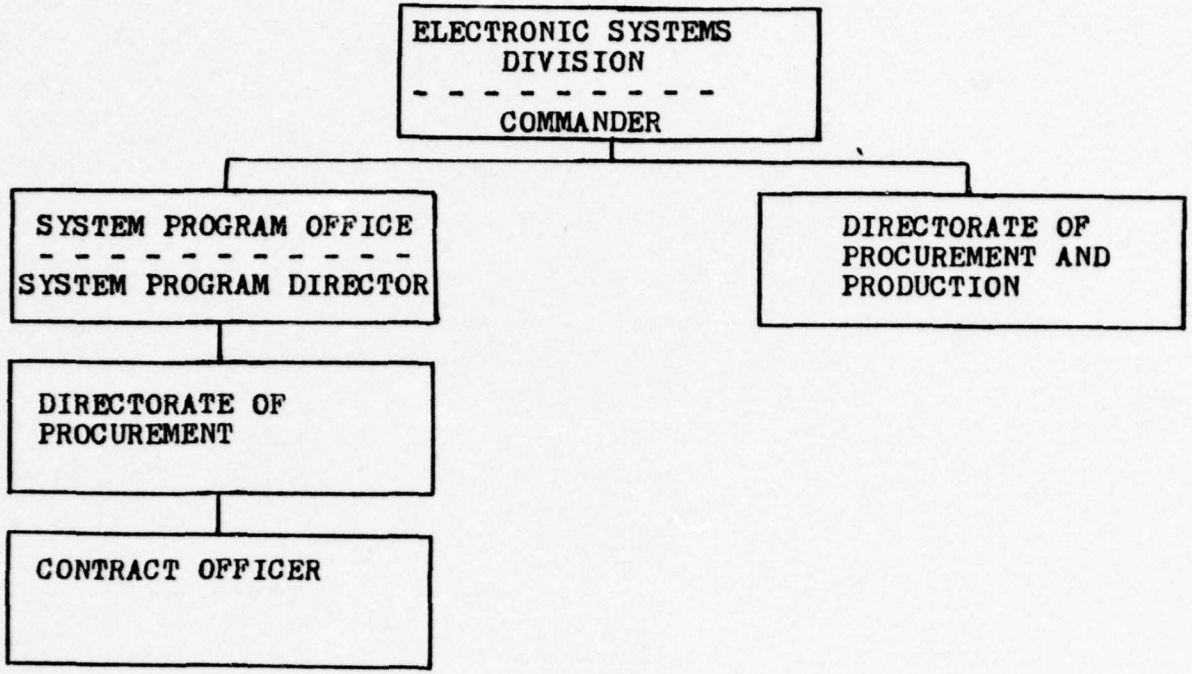
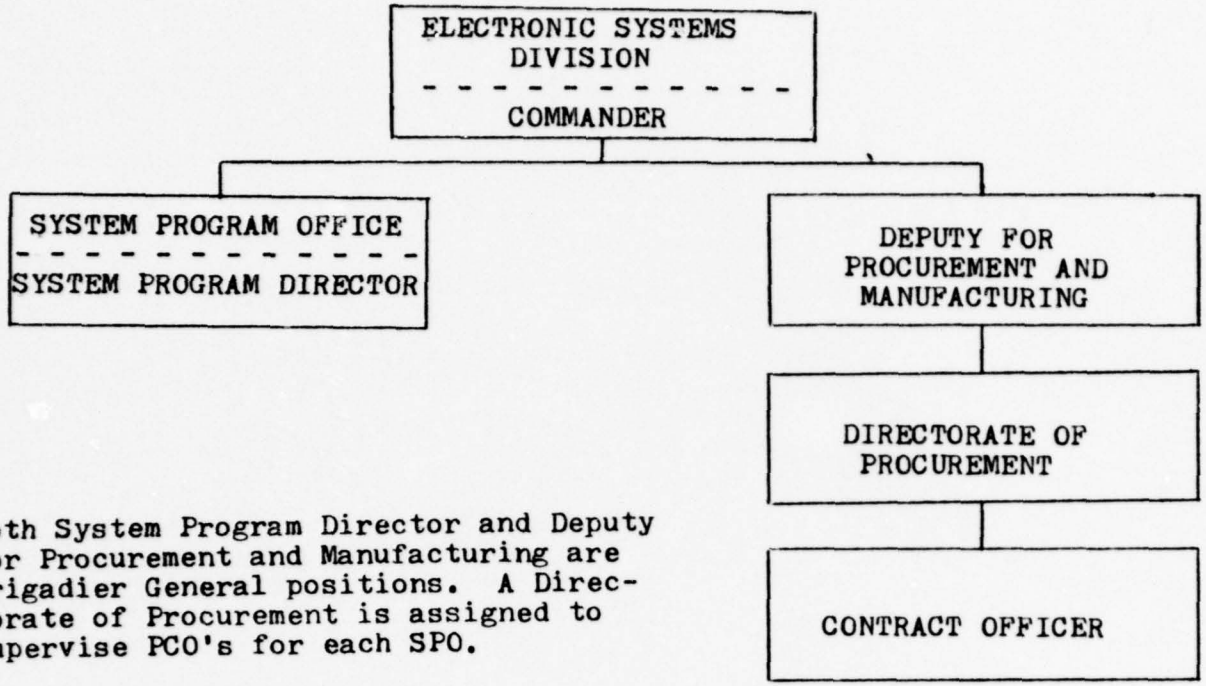


FIGURE 2

ESD ORGANIZATION "BEFORE"
RE-ORGANIZATION EFFORTS



NOTE: Both System Program Director and Deputy for Procurement and Manufacturing are Brigadier General positions. A Directorate of Procurement is assigned to supervise PCO's for each SPO.

FIGURE 3

ESD ORGANIZATION "AFTER"
RE-ORGANIZATION EFFORTS

CHAPTER III

RESEARCH METHODOLOGY

This research study was carried out to determine the current status of the authority relationships of the PCO. Through the perceptions of the PCO's, who actually work in the environment, it was possible to obtain some clues as to whether their authority relationships were satisfactory as currently defined, or whether changes are needed in order to clarify and adjust these relationships. In this chapter, the population, data collection, data collection instrument, design of the study, statistical tests, assumptions, and limitations of the study are discussed.

Population

This study was directed at the procuring contract officers of the United States Air Force within a program management environment in the Air Force Systems Command (AFSC).

The mission of AFSC is to provide the Air Force with up-to-date military equipment. Since its beginning in 1952, AFSC has been working on developing new technology and improving management structures. In the area of management structures, AFSC is presently using the project type of

management which the Air Force refers to as program management (1:30-31).

Program management is found within three of the major divisions of AFSC. These three divisions are: The Aeronautical Systems Division (ASD), the Space and Missile Systems Division (SAMSO), and the Electronic Systems Division (ESD).

Time and financial constraints dictated that this study be limited to only one of the divisions. The Aeronautical Systems Division was eliminated in order to meet one objective of this research, to contrast new results with those of Block and Hadlow at ASD. Choosing between ESD and SAMSO was a matter of selecting the base that was closer to the Air Force Institute of Technology. For this reason, L. G. Hanscom Field, Massachusetts, was selected.

Therefore, the population of interest in this study was limited to the authority relationships of procuring contract officers in the Electronic Systems Division of the Air Force Systems Command. The population was further limited to those PCO's assigned to program management teams[3] within ESD.

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[3]Each system program office has a program director and a program team. The program team is drawn from various functional departments within the Air Force. Each SPO is responsible for the development of a particular system or subsystem.

Data Collection

Due to the limited number of procuring contract officers in the ESD organization, a census of the opinions of the PCO's at ESD was taken. There were 27 PCO's on duty in the system program offices at ESD. The time expended in taking a census was not excessive compared with that of taking a random sample. A further advantage to taking a census was elimination of sampling error.

This census included both military officers and civilian employees who were PCO's in the SPO's at ESD. This census further applied only to contract officers who have a warrant to enter into contractual agreements for the U. S. Government.

Data Collection Instrument

A rank-ordered questionnaire was used to gather information from the PCO's concerning perceptions of their relationships with the Program Manager and the functional procurement manager, the Directorate of Procurement and Production (Appendix A).

The questionnaire measured perceptions of the PCO. In order to obtain these perceptions, the PCO was requested to rank order eight statements concerning various aspects of formal and informal authority. The importance that the PCO attached to the various aspects of authority concerning the Program Manager when compared to the importance attached to

those aspects concerning the Directorate of Procurement and Production provided a measure of perceived authority relationships. A non-parametric correlation model was used to further explain this comparison.

This questionnaire was the same device used by Block and Hadlow in their study. A similar questionnaire was also used by Thamhain and Gemmill in an industry study of the perceptions of selected project employees toward their project manager (1:38). Block and Hadlow used the instrument to gather the same type of data that was obtained in the Thamhain and Gemmill study.

Block and Hadlow submitted the instrument to a panel of judges consisting of personnel from both the academic and operational realms. Suggestions were incorporated into the final instrument. The instrument was then tested for clarity and comprehension by having several contract officers complete the response sheet. Their suggestions were also incorporated to produce the final instrument (1:39).

In order to ascertain present validity, clarity, and comprehension of the instrument, it was given to former procuring contract officers who are now enrolled in the AFIT School of Systems and Logistics. Their responses to the instrument and comments about it indicated that the instrument was acceptable for the purposes of this research. Each former PCO interviewed expressed the opinion that the instrument was clear and easily comprehended. The responses

gathered from the above procedure were not used in the final survey, results, or conclusions of this thesis effort.

Design of the Study

All of the 27 PCO's in the system program offices were requested to respond to the questionnaires. These 27 people were divided into two groups. An attempt was made to randomly assign either a questionnaire concerning the Program Manager or the Directorate of Procurement and Production equally within each SPO organization. Where an equal distribution could not be obtained in one organization, it was balanced by odd numbers of PCO's in other SPO's. One group was asked to respond concerning the Program Manager and the other group concerning the Directorate of Procurement and Production. In no case was any member of either group asked to respond in both categories. This procedure was used to preclude any bias associated with two similar interviews.

The data collection instrument was administered personally by the researchers. Along with the questionnaire a sheet of instructions was supplied. Only very brief explanations about the instructions were given by the researchers. Explanation was kept to a minimum in order to avoid any possible bias that could have been introduced by comments of the researchers.

After collecting the data, mean scores for each group and for each of the eight statements from the questionnaires were computed. Computation of the means was

accomplished in order to rank the importance assigned to each of the statements by the respondents. These means were employed only to give a positional ranking to each one of the statements. By accomplishing this averaging of ordinal data, statistical measures were used to develop correlations and associations.

This ordinal data required the use of non-parametric statistics to test for meaningful relationships between the two groups. These procedures were similar to those employed by Block and Hadlow in their study.

Statistical Test for Correlation

A restatement of the research hypothesis follows:

> The contract officers in a program management environment within the Electronic Systems Division do not perceive a difference in their authority relationships with the program manager as compared to their authority relationships with the Directorate of Procurement and Production.

The statistical device used to support the research hypothesis was the Spearman Rank Correlation Coefficient, r_s. In his book, Non Parametric Statistics for the Behavioral Sciences, Siegel points out that of all the statistics based on ranks, the Spearman Correlation Coefficient is probably the best (8:202). Spearman Rank Correlation Coefficient is a measure of association that requires both variables to be measured at the ordinal level of data or lower.

This permits the objects or individuals to be ranked in two ordered series (8:202).

The Spearman Rank Correlation Coefficient was used to achieve the first objective of this study: i.e., to measure the PCO's perceptions of his position in the authority structure as a correlation of his authority relationships with the Program Manager versus his authority relationships with the Directorate of Procurement and Production.

For the purposes of this study, only positive correlation was considered. In other words, the correlation fell between zero and a positive one. As the correlation coefficient moves toward one, a more positive correlation is indicated. A high positive correlation indicates that the PCO does not perceive a difference between his authority relationships with the Program Manager versus the Directorate of Procurement and Production. In other words, the rank position given to the statements on the questionnaire directed at the Program Manager was similar to the rank position of the statement on the questionnaire directed at the Directorate of Procurement and Production.

For the purpose of this study, a correlation level of .80 was considered significant. The correlation coefficient obtained by Block and Hadlow in their previous study was .8571 (1:52). A significance criterion was not employed in the Block and Hadlow study. Due to a smaller number of

respondents available at ESD (27) as compared to ASD (137), the level of significance should be slightly lower than the correlation coefficient obtained by Block and Hadlow. This level of significance is an approximation or value judgment by the researchers.

Supportive Statistical Testing

To determine if the individual contract officers used similar values in responding to the data instruments, the Kendall Coefficient of Concordance, W, was used. W measures the level of agreement among respondents in each group. The probability associated with the calculated value of W was computed using a Chi square relationship.

In this study, there were two rank ordered lists corresponding to the two variables measured. The authority relationships of the contract officer with the Program Manager were referred to as Group X and the authority relationships with the Directorate of Procurement and Production were referred to as Group Y. W was used to determine associations among each rank ordered list (x and y) separately. This measure is useful in studies of interjudgment or interest reliability (8:229).

Assumptions of the Study

1. The data collected was based on perceptions. It was assumed that the data collected were representative of

the true relationships.

2. It was assumed that each respondent answered each question independently, and that these responses were reflective of true perceptions.

3. In order to permit statistical testing in this study and comparisons with a previous study, the rankings of each statement were averaged to obtain an "average rank" for each statement. This procedure resulted in averaging ordinal data.

4. It was assumed that the data collected by Block and Hadlow were representative of the relationships at ASD.

Limitations of the Study

1. This study was limited to the systems program offices in the Electronic Systems Division, Air Force Systems Command, Hanscom Field, Massachusetts.

2. This study was limited to the Procuring Contract Officers and did not include termination contract officers or administrative contract officers.

3. This study was limited to the analysis of the authority relationships between the PCO and Program Manager and the authority relationships between the PCO and the Directorate of Procurement and Production.

4. The findings of this study were contrasted only to the conclusions of the Block and Hadlow thesis about the PCOs at the Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio.

CHAPTER IV

ANALYSIS OF THE DATA AND FINDINGS

This chapter presents the actual data that was collected during the interviews and the statistical analysis of the data.

Data Collection

Twenty-six interviews were conducted with the procuring contract officers who were assigned to system program teams. Thirteen of the PCOs completed a response sheet which dealt with their authority relationships with Program Managers, while thirteen others completed a similar response sheet dealing with the Directorate of Procurement and Production.

One of the PCOs abstained from completing a response sheet. This action split the two groups into equal numbers of PCOs. By obtaining 26 out of 27 successful responses, the researchers were able to treat this as a census for the purposes of statistical analysis. After completing the statistical analysis laid out in Chapter Three, the researchers determined that the responses of the one abstaining PCO would not significantly affect the results of the research. This determination was based mainly upon the low value of the correlation co-efficient.

Preparation of Data for Statistical Test

Once the data were collected, mean scores for each group were computed for each of the eight statements of beliefs. This mean was computed by taking an average in accordance with the following formula:

$$\frac{1}{N} \sum_{i=1}^{N} X_i$$

In this formula, N refers to the number of respondents which totaled 13 to each group. The X_i relates to each ranking score assigned by the individuals. This data is displayed in Tables 1 and 2. The alphabetical designators which form the columns of the table correspond to the statements on the response sheet. The numerical designators which form the rows correspond to the respondents (PCOs) who were interviewed.

After the data were summarized, it was then ranked according to the average strongest beliefs in each of the two groups. For example, the responses to the PCO's relationships with the Program Manager Statement A was ranked Number 1 indicating the respondents strongest beliefs. The thirteen respondents were in general agreement that the reason they responded to and supported the Program Manager was that he had formal authority.

TABLE 1

DATA GATHERED IN RESPONSE TO CONTRACT OFFICERS' RELATIONSHIPS WITH THE STAFF DIRECTORATE OF PROCUREMENT AND PRODUCTION

SPD	A	B	C	D	E	F	G	H
1	1	8	6	5	3	2	4	7
2	7	6	5	3	4	1	8	2
3	2	8	1	4	3	5	6	7
4	1	8	2	4	6	3	7	5
5	1	6	7	3	8	2	4	5
6	1	8	3	4	6	7	2	5
7	8	7	2	3	1	4	5	6
8	1	8	3	2	7	6	4	5
9	2	6	7	4	5	1	8	3
10	8	2	3	5	1	4	7	6
11	1	7	4	5	6	3	8	2
12	1	2	3	4	5	6	7	8
13	1	8	3	4	6	2	7	5
	35	84	49	50	61	46	77	66
$\Sigma/13$	2.69	6.46	3.77	3.85	4.69	3.54	5.92	5.08

TABLE 2

DATA GATHERED IN RESPONSE TO CONTRACT OFFICERS' RELATIONSHIPS WITH THE SYSTEM PROGRAM MANAGER

SPD	A	B	C	D	E	F	G	H
1	3	8	2	7	5	4	6	1
2	1	7	5	6	4	2	8	3
3	4	8	7	6	5	2	3	1
4	1	8	7	5	6	2	4	3
5	1	8	2	4	3	6	7	5
6	5	7	8	3	6	1	4	2
7	1	8	6	7	5	2	4	3
8	1	7	8	6	5	3	4	2
9	3	8	4	5	6	2	7	1
10	1	8	6	4	8	2	4	3
11	1	8	7	6	5	2	3	4
12	1	8	4	3	7	5	6	2
13	1	5	4	6	8	2	7	3
	24	98	70	68	73	35	67	33
Σ/13	1.85	7.54	5.38	5.23	5.62	2.69	5.15	2.54

The averages used in the above process are not "averages" in the true sense, but were utilized only to give a relative position ranking to each of the statements of beliefs. The data yielded from this ranking was ordinal level data and was treated as such. Once the rankings were completely finalized, each set of data were arranged in a tableau so that each set is easily contrasted with the other set. Reference Table 3 for this data.

Research Hypothesis

As mentioned previously, the two variables correlated in this research are, first, the authority relationships between the PCO and the Program Manager (Group X), and second, the authority relationship between the PCO and the Directorate of Procurement and Production (Group Y).

The research hypothesis is restated:

> The procuring contract officers in a program management environment within the Electronic Systems Division do not perceive a difference in their authority relationships with the Program Manager as compared to their authority relationships with the Directorate of Procurement and Production.

Using a standard statistical shorthand along with the notation for the two variables defined above, the hypothesis tested reads:

H_o : $\rho xy = 0$ (implies no association or relationship between the variables X and Y)

H_1 : $\rho xy = 0$ (implies an association or relationship between the variables X and Y)

TABLE 3

DATA SUMMARY AND RANKINGS

STATEMENT	A	B	C	D	E	F	G	H
Σ/N (SPD)*	1.85	7.54	5.38	5.23	5.62	2.69	5.15	2.54
Σ/N (PP)**	2.69	6.46	3.77	3.85	4.69	3.54	5.92	5.08
Rank (SPD)	1	7	6	4	5	3	8	2
Rank (PP)	2	8	7	4	5	1	6	3

*SPD refers to the System Program Director

**PP refers to the Staff Directorate of Procurement and Production.

Here, the null hypothesis (H_o) implies there is no relationship between Group X and Group Y perceptions of their authority relationships. The alternate hypothesis implies there is a relationship in the way in which the two groups perceive their authority relationship with the Program Manager versus the Directorate of Procurement and Production.

Spearman Rank Correlation Coefficient

The statistical test used to test for correlation between Group X and Y was the Spearman Rank Correlation. This test yielded a correlation coefficient, r_s. Because a census was acquired in the data collection process, then the computed value of r_s can be directly compared to the value of r_s that was chosen to be the level of significance. The calculations of the correlation coefficient are presented in Appendix D. These calculations yielded the following value for r_s.

$$r_s = .5238$$

The previously identified value for a level of significance was as follows:

$$r_s = .8000$$

Findings

By comparing the computed value of r_s with the value assigned as significant, the researchers can not reject the hypothesis that the procuring contract officers do

not perceive a difference in their authority relationships with the Program Manager as compared with their authority relationships with the Directorate of Procurement and Production.

Further Statistical Testing

Kendall Coefficient of Concordance. In addition to testing the research hypothesis using the correlation coefficient, the Kendall Coefficient of Concordance was used to measure the interrespondent reliability in each group (X and Y). The computed values for the coefficients of concordance for each group were as follows:

$$W_x = .628$$

$$W_y = .271$$

The calculations for the Kendall Coefficient of Concordance for each group are presented in Appendix E.

Test of Significance for W. To be able to test if the values of the Kendall Coefficient of Concordance are significantly different from zero, the W values must be converted into Chi-square (X^2) values through the following formulas:

$$X^2 = K(N-1)W$$

Substituting for Group X

$$X^2 = 13(8-1)\ (.628)$$

$$X^2 = 57.148$$

Substituting for Group Y

$$X^2 = 13(8-1)(.271)$$

$$X^2 = 24.661$$

These figures are now compared to the Chi-square values found in the statistical tables (7:619). Using N-1 or 8-1 = 7 degree of freedom, it is observed that the probability of the table value of Chi-square being greater than the calculated sample value for Group X is less than .001, and for Group Y the probability is also less than .001.

Findings

From this test, it was concluded with high assurance that the agreement among our respondents in each group is higher than it would be by chance. Finally, Siegel uses the following interpretation of the W coefficient:

> . . . a high or significant value of W may be interpreted as meaning that the observers or judges (respondents) are applying essentially the same standard ranking the . . . objects under study [8:229].

Summary

In this chapter, the data that was collected from the PCOs in a program management environment at the Electronic Systems Division was presented. The Spearman Rank Correlation Coefficient was computed from the data and compared to the previously selected level of significance for that value. From this comparison the researchers

could not reject the hypothesis that the procuring contract officers do not perceive a difference in their authority relationship with the Program Manager versus the relationships with the Directorate of Procurement and Production. Further, the computation and testing of the Kendall Coefficient of Concordance revealed that the respondents were generally using the same standards in ranking the statements on the questionnaires. The impact of these findings and several recommendations for related studies are discussed in the next chapter.

CHAPTER 5

SUMMARY, RESULTS OF THE REPLICATION, CONCLUSIONS, AND RECOMMENDATIONS FOR FUTURE STUDY

This chapter presents a summary of research results including a discussion of important organizational changes at ESD that occurred during the research effort. The replication of the Block and Hadlow thesis is analyzed and recommendations are made concerning future studies.

Summary

In the literature reviewed during the research, there was much concern expressed about the conflict in the authority relationships of the procuring contract officer. In fact, the analysis of the data collected during the research effort indicated there was no significant conflict in the PCO's perceptions of his relationships with the program manager and the Directorate of Procurement and Production. It is the opinion of the researchers that a reorganization effort and an upgraded rank structure within the procurement organization has been responsible for much of the clarification of the PCO's authority relationships.

ESD implemented the organizational change to achieve a more centralized procurement work force. As a

result of the change, all the PCOs are in one organization and formally responsible to only one manager, the Directorate of Procurement and Production. However, the PCOs must continue to support the different Program Managers and the various programs.

While talking with many of the PCOs at ESD, there were mixed emotions about the importance of this organizational change. Some PCOs felt that nothing had really changed except the organizational charts. Other PCOs felt that the change had strengthened the procurement organization in that all PCOs are now unified into one organization under one manager.

As a part of the reorganization effort at ESD, the position of the Directorate of Procurement and Production was upgraded to a Brigadier General position. This action equalized the Directorate's rank with that of the Program Manager. Conversations with many of the PCOs indicated that this action will give the procurement work force, which includes the PCOs, an equal voice in the business decisions made about the procurement aspects of the different programs. The researchers feel this equalization of rank will promote more effective communication between the technical and procurement personnel within the program management environment.

In the future, it appears the PCO will continue to support the Program Managers in the procurement aspects of

the programs and simultaneously be responsible to the Directorate of Procurement and Production. Since he is now directly responsible to one supervisor and is a formal part of an organization through which he can voice his opinions, the PCO can be assured that his opinions will be communicated and considered equally with those presented by the technical advisors. This assurance is based upon a supervisor, the Directorate of Procurement and Production, whose position in the organizational structure and whose rank are now equal with the Program Managers. Some aspects of the PCO's authority relationships, however, will continue to change as his environment changes.

Results of the Replication

A comparison of Block and Hadlow's results to the present study showed a significant change in the authority relationships of the PCO. Block and Hadlow's results indicated that the PCOs perceived their authority relationships with the Program Manager in the same way that they perceived their authority relationships with the Directorate of Procurement and Production. The perception of the PCO that the two managers to which he responds have equal authority over him created conflict in his relationships. The results of this thesis, on the other hand, pointed out that much of the conflict concerning the PCO's authority relationships has been resolved. It was the opinion of

the researchers that this apparent resolution of conflict can be attributed to the following:

1. The organizational changes implemented at ESD which centralized all procuring contract officers and their procurement supervision into one single organization.

2. The upgrading in the rank of the Directorate of Procurement and Production to an equal level with the Program Managers.

3. The dynamic environment within which the PCO functions.

Conclusions

The original hypothesis of this thesis effort was that the PCOs do not perceive any difference in their authority relationship with the Program Manager as compared with their authority relationship with the Directorate of Procurement and Production. This hypothesis was based upon an extensive literature review. The statistical results of this research and interviews with PCOs at ESD did not support this contention. Therefore, the researchers conclude that at present there is no significant conflict in the PCO's authority relationships within the ESD program management environment.

Recommendations for Future Study

In order to follow up this study and in view of the Air Force Systems Command's planned organizational changes, the following recommendations for future studies are made:

1. This study should be re-accomplished at the Aeronautical Systems Division (ASD) and the Space and Missile System Organization (SAMSO) since both of these organizations are involved with procurement of systems and utilize program management for their acquisition.

2. A study in the Army, Navy, or the National Aeronautics Space Administration should be explored. Examination of the program management concept and the position of the PCO within some of the other agencies of the Federal Government could provide interesting contrasts to this study.

APPENDIX A

DATA GATHERING INSTRUMENT

APPENDIX A

DATA GATHERING INSTRUMENT

1. This thesis from the Air Force Institute of Technology, School of Systems and Logistics, explores the project authority relationships of the contracting officer. Specifically, we are exploring the perceived project authority relationships between contracting officers and their System Program Director as compared to contracting officers and the Staff Directorate of Procurement and Production. The study is being conducted solely within various System Program Offices of the Electronic Systems Division at Hanscom Field, Massachusetts.

2. In order to gather the necessary data, we request that you complete the attached response sheet in the following manner.

a. Read the directions on the response sheet carefully.

b. Read all the responses.

c. Based on your perceptions of your authority in your present position, rank the responses from 1 through 8. (A rank of 1 indicates your strongest belief, 2 your next strongest belief, and so on through 8.) Do not use the same ranking for two or more beliefs.

d. Please do not put your name or any identifying marks of the response sheet.

3. Any information which you have given will be treated confidentially; it will not be identified with you in any manner. In return, we ask that you not divulge the contents of this data instrument or your responses to other members of your organization. Confidentiality is essential to maintain objectivity of the research data.

4. If anyone has previously mentioned this study to you or if you have any reason to believe that you are not able to respond objectively, please inform us at this time.

RESPONSE SHEET

Please rank the following eight statements, in order of importance, indicating why you respond to the System Program Director:

A. _____ I feel he has the formal authority.

B. _____ I feel he can influence my salary.

C. _____ I feel he can influence my promotion.

D. _____ I feel he can influence future work assignments.

E. _____ I feel he can apply pressure or penalize me in some way.

F. _____ I respect him and place confidence in his special knowledge and advice.

G. _____ He has established a personal friendship with me.

H. _____ I feel that the things he asks me to do are professionally challenging.

RESPONSE SHEET

Please rank the following eight statements, in order of importance, indicating why you respond to the Staff Directorate of Procurement and Production:

A. _____ I feel the staff has the formal authority.

B. _____ I feel the staff can influence my salary.

C. _____ I feel the staff can influence my promotion.

D. _____ I feel the staff can influence future work assignments.

E. _____ I feel the staff can apply pressure or penalize me in some way.

F. _____ I respect the staff and place confidence in their special knowledge and advice.

G. _____ Staff members have established a personal friendship with me.

H. _____ I feel that the things the staff asks me to do are professionally challenging.

APPENDIX B

THE SPEARMAN RANK CORRELATION: r_s

APPENDIX B

THE SPEARMAN RANK CORRELATION: r_s

Adapted Summary of Procedures (8:212)

1. Rank the observations on the first variable (X) from 1 to 8. Rank the observations on the second variable (Y) from 1 to 8.

2. List the 8 statements. Give each statement's rank on the first variable and the rank on the second variable next to this entry.

3. Determine the value of d_i for each statement by subtracting the Y rank from the X rank. Square this value to determine each statement's d_i^2. Sum the d_i^2's for the 8 cases to determine d_i^2.

4. Compute r_s from the formula:

$$r_s = 1 - \frac{6 \sum_{i=1}^{N} d_i^2}{N^3 - N}, \text{ where } N = 8.$$

APPENDIX C

THE KENDALL COEFFICIENT OF CONCORDANCE, W

APPENDIX C

THE KENDALL COEFFICIENT OF CONCORDANCE, W

Adapted Summary of Procedures (8:237)

1. Let N equal the number of entities to be ranked (8), and let K equal the number of judges assigning ranks (13). Arrange the observations in a K X N matrix.

2. For each statement, determine R_j which is the sum of the ranks assigned to that statement by the judges.

3. Determine the mean of R_j. Express each R_j as a deviation from that mean. Square these deviations, and sum the squares to obtain S.

4. Compute W from the following formula:

$$W = \frac{S}{1/12\ K^2(N^3 - N)}$$

5. The method of determining whether the calculated value of W is significantly different from zero depends on on the size of N. If N is larger than 7, use the formula:

$$X^2 = \frac{S}{1/12\ KN(N+1)}$$

to compute a value for Chi-square. Test the criticality for N-1 degrees of freedom by referring to the Table of Critical Values of Chi-square.

APPENDIX D

SPEARMAN RANK CALCULATIONS

APPENDIX D

SPEARMAN RANK CALCULATIONS (8:204)

From Table 3, the average responses and their respective rankings in each group are first arranged in a matrix as follows:

i	X_i	$R(X_i)$	Y_i	$R(Y_i)$	d_i	d_i^2
A	1.85	1	2.69	1	0	0
B	7.54	8	6.46	8	0	0
C	5.38	6	3.77	3	3	9
D	5.23	5	3.85	4	1	1
E	5.62	7	4.69	5	2	4
F	2.69	3	3.54	2	1	1
G	5.15	4	5.92	7	3	9
H	2.54	2	5.08	6	4	16
						$\Sigma = 40$

where,

i = the statements on the response sheets

X_i = the average on statement i for Group X

Y_i = the average on statement i for Group Y

$R(X_i)$ = the rank assigned to an observation on the basis of X_i

$R(Y_i)$ = the rank assigned to an observation on the basis of Y_i

$d_i = R(X_i) - R(Y_i)$

The Spearman Rank Correlation Coefficient (r_s) is computed using the following formula:

$$r_s = 1 - \frac{6(\ d_i^2)}{N(N^2 - 1)}$$

Substituting, the value for r_s for our population is:

$$r_s = \frac{1 - 6(40)}{8(8^2 - 1)}$$

$$r_s = .5238$$

APPENDIX E

KENDALL CONCORDANCE CALCULATIONS

APPENDIX E

KENDALL CONCORDANCE CALCULATIONS (8:237)

The individual rankings for each statement by the various contract officers are in Tables 1 and 2. The sum of the individual rankings in each group is equal to 468 with a mean of 468/8 or 58.5, in other words, $(R_j)/N=58.5$ for <u>both</u> Group X and Y.

The following matrix presents the squares of the deviations from this mean for each statement:

i	R_j	$(R_j - (R_j)/N)^2$	R_j	$(R_j - (R_j)/N)^2$
A	24	1190	35	552
B	98	1560	84	650
C	70	132	49	90
D	68	90	50	72
E	73	210	61	6
F	35	552	46	156
G	67	72	77	342
H	33	650	66	56
		$\Sigma = 4456$		$\Sigma = 1924$

where,

i = statement on the response sheet

R_j = sum of the ranks assigned to each statement by the 13 respondents in each group

(R_j/N) = the mean of all R_j's for each group

N = the total number of statements of each response sheet

$$S = \Sigma(R_j - \frac{R_j}{N})^2$$

$S_x = 4456$

$S_y = 1924$

The Kendall Coefficient of Concordance, W, is computed using the formula:

$$W = \frac{S}{1/12K^2(N^3-N)}$$

where, K = number of respondents ranking N
number of statements

Substituting, the value of W for Group X and Y are:

$$W_x = \frac{4456}{1/12(13)^2(8^3-8)}$$

$$= .628$$

$$W_y = \frac{1924}{1/12(13)^2(8^3-8)}$$

$$= .271$$

APPENDIX F

THE PROCUREMENT PROCESS

APPENDIX F

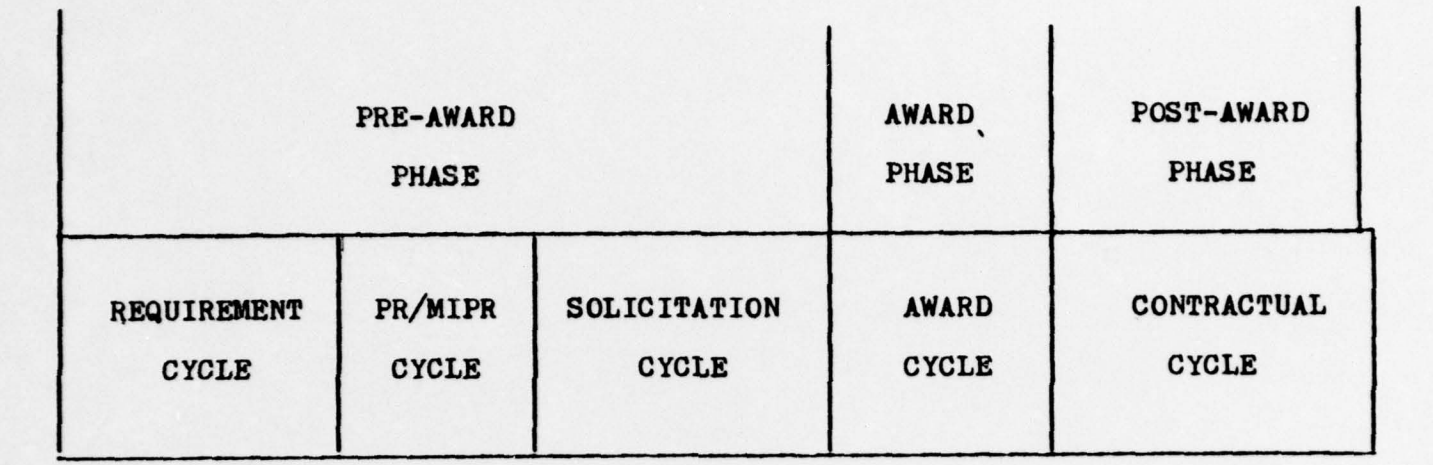
THE PROCUREMENT PROCESS

The procurement process begins with a need of the Federal Government and includes all actions taken to fulfill or satisfy the need. The procurement process is illustrated on the succeeding page.

Once a requirement has been identified and reviewed, a Purchase Request is completed. This Purchase Request in turn provides the information for the Request for Proposal (RFP) or the Invitation for Bids (IFB). Once the RFP or IFB is completed, the procurement process progresses to the solicitation cycle. In the solicitation cycle, the RFP and IFB relay to industry the details and specification of the system or item being procured. When the RFP and IFB are returned, the procurement process advances to the award phase. At this point, if the item or service is procured via IFB, the contractor is selected following an evaluation of his bid. On the other hand, if the item is purchased through an RFP, negotiations are required before a contractor is selected. Once the contract is signed, the procurement process advances to the final phase, the post award cycle. This cycle includes all activities that strive to

insure that a successful product is completed within the time, cost, and performance parameters. The procurement process is completed when all contractual obligations are fulfilled.

THE PROCUREMENT PROCESS



APPENDIX G

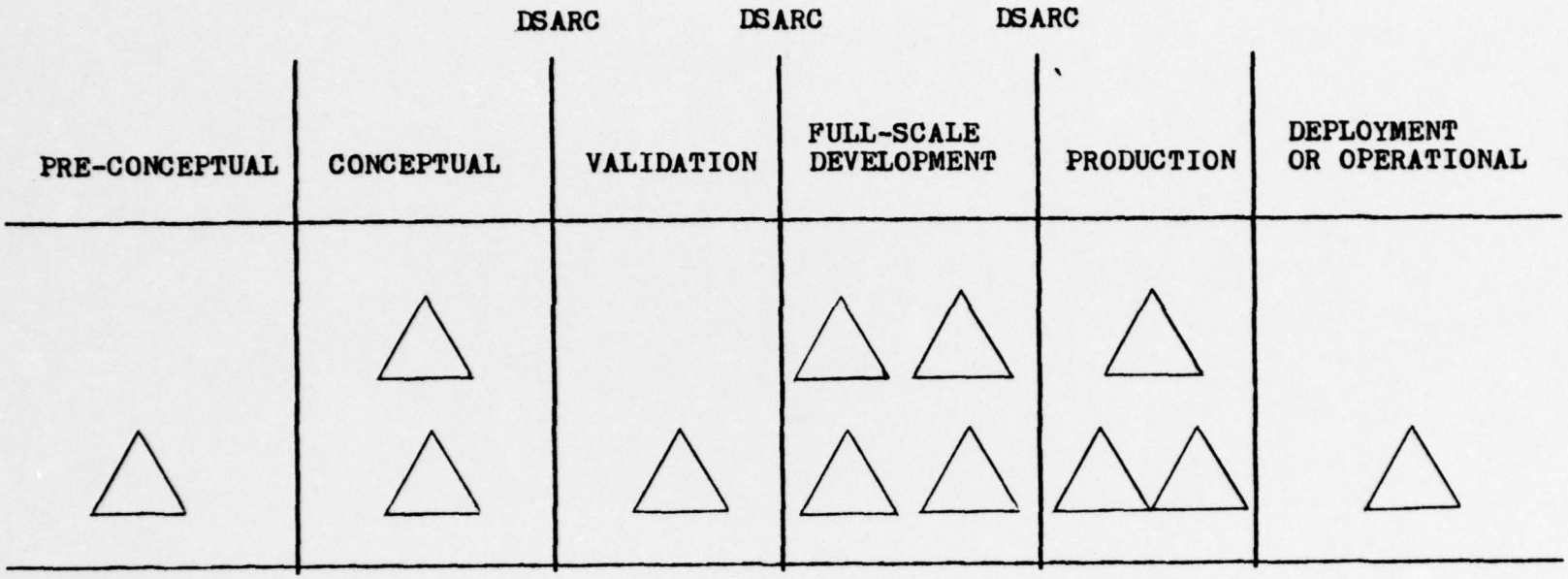
THE WEAPONS ACQUISITION PROCESS

APPENDIX G

THE WEAPONS ACQUISITION PROCESS

The weapons acquisition process is supported by the procurement process. In the procurement of major systems, the procurement process is repeated a number of times within the acquisition cycle. Each phase of the weapons acquisition process contains several complete procurement processes. This concept is displayed graphically on the succeeding page.

THE WEAPON SYSTEMS ACQUISITION PROCESS



= THE PROCUREMENT PROCESS

(may occur any number of times in each phase of the weapon systems acquisition process depending on the particular system being acquired)

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SELECTED BIBLIOGRAPHY

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